

a few errors have unfortunately remained uncorrected. These he has noted on p. xvi."

One or two have still escaped the author's notice. Muscat is ordinarily spelt by him "Maskat," but once "Mascot" appears; and no regular rule is followed with regard to the hyphening of Arabic compound names; thus we have "Roba-el-Khali" (p. 73), but "Wadi er Rumma" (p. 71), which is spelt "Wadi-er-Rumma" in the index. So in other cases. The correct form, of course, is Roba el-Khali, Wadi er-Rumma; only one hyphen is necessary.

We are at one with Mr. Hogarth as to the undesirableness of too pedantically accurate a transcription of Oriental names, but it seems to us that "Hadramut" and "Riad" would be better replaced by Hadhramut and Riadh, which we can pronounce even if the Germans cannot. And though Mr. Hogarth defies the pedant with his "Bedawins," we are unable to back him up in his defiance; "Bedouins" or "Beduins" may be all very well, but not "Bedawins"; either "Beduins" or "Bedawin," one or the other.

In the maps there are one or two mistakes which need correction; for instance, in Fig. 36, "Yidda." In Fig. 16 the railway is made to cross the Nile immediately south of Siut, which is itself placed much too far south. In reality the railway crosses further south than in the map, at the Nag' Hamâdi bend. South of Aswân, spelt here and in other maps "Assuan," the railway gets wrong again. There is no line between Shellal and Wadi Halfa, and there *is* a line along the Nile bank south of Wadi Halfa, which runs as far as the Third Cataract, to Kerma. In Fig. 49 the Athens-Kephisia-Lavrion line is not inserted at all, nor is the new Athenian "underground" from the Theseion *viâ* Monasteráki to the Omonoias. It is true that these are only sketch-maps, but if the railways are inserted in them at all, they should be inserted correctly. In the fine ethnographical map opposite p. 176, we do not quite like the unhesitating colouring of Egypt with the Semitic yellow; there should be some brown or other coloured stripes across it. Nor do we think that pure brown should begin with the Wadi Hammâmât; Nuba is not spoken north of Darâw, south of the 25th parallel, so the line should run north-eastward from Darâw to Kuşêr. Should there not also be some Magyar, Szekler and Teutonic stripes and spots in the portion of Hungary and Siebenbürgen which comes into the upper left-hand corner of this map and is entirely coloured with Rumanian purple? It is true that the book does not deal with these parts at all, but if they are coloured in the map, the coloration should be correct.

For these cartographical slips Mr. Hogarth, of course, cannot be held entirely responsible. We point them out merely that they may be corrected in the second edition. They in no way detract from the value of the maps as a whole.

One thing we regret, the absence of photographs. A few pictures of salient features of the land—a Greek isle, a desert wadi, a Cilician gorge—would have added greatly to the interest of the book.

We welcome Mr. Hogarth's work, then, not only as a notable contribution to geographical literature, but as a book which will—as is the idea of the series—appeal to a

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larger public than the members of scientific societies, and will probably not only cause its general readers to take an unwonted interest in geography, but will also direct their attention to threatening political questions for which sooner or later they will be called upon to help to devise a solution.

H. H.

CHEMISTRY AND LIFE.

Das Eisen als das thätige Prinzip der Enzyme und der lebendigen Substanz. Von N. Sacharoff. Pp. 83. (Jena: G. Fischer, 1902.) Price M. 2.50.

THIS philosophical treatise, originally written in Russian, is presented to us in a translation by Dr. Rechtsamer. Without going so far as to say it is of the first importance, it may be safely affirmed that it will be welcomed by physiologists as a contribution to the discussion of the more obscure chemical processes connected with the life of the protoplasm. The author at the outset reviews the different hypotheses that have been advanced as to the intimate constitution of living matter, and finds them all unsatisfactory. He holds that the behaviour of protoplasm cannot be attributed to either its organisation, or its chemical composition or structure, and suggests that all the vital processes must be regarded as arising from a decomposition or splitting of the living substance in consequence of the access of oxygen, followed by a series of recombinations. Hence he turns to a study of the nature of this auto-decomposition with a view to determining its cause.

Proceeding to the action of oxygen in the animal and vegetable cell, and seeking for something universally present therein which is capable of easy oxidation, and of yielding compounds which can be reduced again or further decomposed with comparative ease, he considers he has found it in minute traces of iron. He puts forward accordingly a hypothesis of his own, to the effect that the various vital phenomena of protoplasm are set up by the oxidation of a minute trace of iron contained in the living substance, with subsequent or concurrent hydrolysis.

This theory is examined at some considerable length in the subsequent chapters, attention being given first to enzyme action, which he takes as one of the most remarkable of the metabolic processes. His views on this point will not commend themselves to all physiologists, but he argues in favour of them with some skill. After reviewing the theories of enzyme action advanced by Liebig, Nägeli, Berzelius, Würtz and more recent writers, and quoting published experimental evidence of the action of several of these bodies, he suggests that the active principle of enzymes is a substance which is capable of auto-oxidation and auto-reduction, and that the working which they exhibit depends upon alternate oxidation and reduction of this active principle. An experiment of his own with papaïn may be quoted in illustration of his view. He prepared a solution containing 2 per cent. of papaïn and heated it to boiling. Taking another solution of the same enzyme, containing 10 per cent., he prepared three tubes. No. 1 contained two drops of this active extract and 10 c.c. of the boiled extract; No. 2 two drops of the active extract with 10 c.c. of water; No. 3 10 c.c. of the boiled extract alone. He added to each a

measured amount of gelatin, on which papain works. No. 1 digested the gelatin much more rapidly than No. 2, while No. 3 was inactive. As both Nos. 1 and 2 contained the same amount of active enzyme, he considers it certain that the boiled solution contained some constituent necessary for the action of the papain. The solvent action of papain on gelatin thus requires the presence of two substances, the enzyme itself, which is split up and destroyed by heating, and another substance which is contained in the heated enzyme.

He considers subsequently at some length the group of oxidases, possessing in such a great degree the power of taking up oxygen and communicating it to the bodies which they attack.

The conclusion is that there exists in all enzymes the substance already alluded to, and that this is an iron-containing nuclein. He gives the name *bionuclein* to this hypothetical body.

It would be too long a task to follow the author through all the developments of his theory. They may be gathered from the statement he makes in his third chapter, that since the chemistry of all vital phenomena must be fundamentally the same, the processes which are the foundation of enzyme action must be also the foundation of all vital phenomena, and all must alike depend upon the oxidation of bionuclein. In his later chapters he deals with the behaviour of the cell substance, the fusion of sexual cells, the phenomena of karyokinesis, the phenomena presented by muscle and nerve and by the central nervous system.

The treatise is one which is deserving of careful consideration, though it is doubtful how far many of the author's conclusions will be held deserving of support.

TWO ASPECTS OF THE THEORY OF PROBABILITY.

Probabilités et Moyennes géométriques. By Emmanuel Czuber. Translated into French by Herman Schuermans, with a preface by Charles Lagrange. Pp. xii + 244. (Paris: A. Hermann, 1902.) Price Fr. 8.50.

Philosophical Essay on Probabilities. By Pierre Simon Marquis de Laplace. Translated from the sixth French Edition by Frederick Wilson Truscott, Ph.D., and Frederick Lincoln Emory, M.E. Pp. iv + 196. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1902.)

WE have here two books dealing with widely different aspects and applications of the theory of probability.

Prof. Czuber's treatise is a collection of problems relating to probabilities in which the number of cases of success and failure, instead of being finite or at any rate discrete, is continuously infinite. The cases considered relate to points chosen arbitrarily on a line, in a plane or in space, to lines drawn arbitrarily in a plane or in space, to surfaces taken arbitrarily in space, and to mean values depending on such random constructions. Such problems have a great interest for the pure mathematician, and they lead to a number of apparent paradoxes depending chiefly on what is meant by "taken at random," and many of these have been the subject of much con-

troversy. No better preparation for the study of such paradoxes can be suggested than a comparison of the results of choosing a point so that all values of its Cartesian coordinates are equally probable with the corresponding results when all values of the polar coordinates are equally probable. The author has made an extended study of the problems proposed by various English writers in the *Educational Times*, of the writings of French mathematicians, and in particular of the important memoir of 1868 by Crofton. The result of this study has been the insertion of a number of historic notes and remarks, including a brief but full discussion of the famous "needle problem" of Buffon, *i.e.* the problem of calculating the probability that a needle dropped at random on a sheet of ruled paper should cross one of the ruled lines when the needle is too short ever to cross two lines. The author quotes Dr. Wolf's experimental tests, which gave a result falling well within the limits of probable error.

The second book is a translation of the famous philosophical essay by Laplace, which was originally based on a course of lectures given by him in 1795 at the *École Normale* when he was appointed professor of mathematics with Lagrange as a colleague. It is purely philosophical, and deals with general questions arising out of probabilities and hope, their applications to natural philosophy, to prediction of the decisions of juries and other assemblies, to problems of life insurance and to the dispersion of superstitions. In regard to the latter use, Laplace's words may well be quoted:—

"All these prejudices and the terrors which they inspire are connected with physiological causes which continue sometimes to operate strongly after reason has disabused us of them. But the repetition of acts contrary to these prejudices can always destroy them."

There are few illusions arising from a failure to appreciate the calculus of probabilities which have done so much harm in the world as that which has given rise to the confirmed gambler or speculator. The very definite mental impression produced by a valuable prize and the difficulty to form a tangible conception of the probability factor which reduces the expectation to one of loss have proved fruitful sources of revenue to organisers of lotteries. But there is another cause which prevents a study of the theory of probability from saving the gambler from ruin. If in a game of even chances red turns up twenty times in succession, it is still an even chance whether red or black turns up on the twenty-first time; but no amount of mathematical reasoning will enable the confirmed gambler to realise that a previous run of bad luck gives no grounds for the expectation of recovering his losses by a run of good luck in the future.

OUR BOOK SHELF.

Upland Game-Birds. By E. Sandys and T. S. Van Dyke. Pp. ix + 429; illustrated. (New York: the Macmillan Company; London: Macmillan and Co., Ltd., 1902.) Price 8s. 6d. net.

THIS is the first of a series of ten volumes on American game and fish, published under the title of the "American Sportsman's Library," which has come under our notice; and if its companions are anything near so good as the